Gastroduodenal Hemorrhage: Surgical Management

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• **Two thousand five hundred forty-five cases of upper gastrointestinal tract hemorrhage were studied especially with a view to determining the indications for urgent surgical treatment.**

Decisions as to whether and when to operate were as follows:

Immediate operation for patients over 50 years with a good history of ulcer and a severe initial bleed.

Operation after the first repetition of bleeding in patients (1) over 50 with a good history and a mild initial bleed, (2) over 50 with inconclusive history but severe initial bleed, (3) under 50 with a good history and a severe initial bleed.

In all other cases, operation was used only if conservative treatment failed.

Absolute indications for operation were (a) association with perforation, (b) association with stenosis, (c) persistence of severe ulcer pain after hemorrhage, (d) continuous bleeding.

Since operation is to be avoided if possible in cases of esophagitis, erosive gastritis and small acute or subacute ulcers, emergency gastroscopy has valuable uses.

Where operation is deemed necessary and no obvious lesion found at laparotomy, blind gastrectomy* appears to be the most satisfactory procedure.

The mortality rate associated with upper gastrointestinal tract bleeding in patients less than 60 years of age was low (2.5 per cent). Even in cases in which operation was required, it was 6.2 per cent. Over 60 years the mortality rises steeply with increasing age, and in cases of operation the rise is even steeper.

By using the methods of selection the overall mortality rate was appreciably reduced.

IN THE Gastric Unit at St. James' Hospital, London, we have since 1939 made a particular study of the problem of gastroduodenal hemorrhage. In 20 years 2,545 patients with hemorrhage severe enough to warrant urgent admission to hospital were studied. The causes of the hemorrhage covered a wide diagnostic field (Table 1). Cases of severe melena due to lesions of the lower bowel such as ulcerative colitis, colonic carcinoma and diverticulitis were not included in the study, although these may exsanguinate the patient and cause profound shock.

It will be seen that there are five large groups:

1. What we call the peptic ulcer-gastritis group
2. Portal hypertension
3. Carcinoma of stomach
4. The uncertain diagnosis group
5. A group of rarer diagnostic causes.

The 101 cases in which the diagnosis was not established made up 4 per cent of the total. Of the 11 "other gastric neoplasms," seven were leiomyomas, or leiomyosarcomas; one was an ulcerating neurofibroma and two were lymphosarcomas and one a benign adenoma. The carcinomas of the pancreas and bile ducts were all advanced and inoperable.

Retrograde intussusception of the efferent loop of a gastroenterostomy is difficult to diagnose in the acute phase, but we have been able on two occasions to see this happening through the gastroscope. It has been surprising to us how rare is hematemesis from a swallowed foreign body.

It is the peptic ulcer-gastritis group I wish particularly to discuss, as these cases offer the best prognosis and are more amenable to treatment.

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TABLE 1.—*Diagnosis in 2,545 Cases of Gastroduodenal Hemorrhage*

	No. of Cases
Peptic ulcer-gastritis group:	
Gastric ulcer	1,019
Duodenal ulcer	908
Anastomotic ulcer	104
Esophageal ulcer	8
Gastritis	173
Hiatal hernia	51
Portal hypertension	80
Carcinoma of stomach	66
Mallory-Weiss syndrome	3
Carcinoma of duodenum	1
Carcinoma of esophagus	2
Other gastric neoplasms	11
Gastric diverticulum	1
Pancreatitis	2
Carcinoma of pancreas and bile ducts	7
Aortic aneurysm	1
Swallowed foreign body	1
Retrograde intussusception	2
Telangiectasis of ileum	1
Polycythemia vera	1
Hemocholocyst	1
Meckel's diverticulum	1
Uncertain etiology	101

*The author uses *gastrectomy* to mean subtotal or partial gastrectomy.

TABLE 2.—*Comparison of Reported Results of Early Operation and Late Operation in Two Series of Cases of Gastroduodenal Hemorrhage*

	Early Operation			Late Operation		
	Number Patients	Died	Mortality (Per Cent)	Number Patients	Died	Mortality (Per Cent)
Finsterer 1914-46:						
Private cases	77	2	2.5	59	15	25.4
Hospital cases	73	4	5.5	64	13	20.3
Total	150	6	4.0	123	28	22.8
Gordon-Taylor 1933-39	18	1	5.5	11	4	36.0

In London, the number of gastric ulcers is very large, the ratio of duodenal ulcer to gastric ulcer being 3.5:1, and it will be seen that hemorrhage is more often a presenting symptom of gastric than of duodenal ulcer. This, when considered in conjunction with the fact that the mortality of hemorrhage from gastric ulcers in this series was 13 per cent whereas that in duodenal ulcers was 8 per cent, gives some indication of the particular problem we are faced with in our area.

It is not within the scope of this paper to discuss the medical management of these cases. We have, over the years, followed the advances which started with Meulengracht[3] in 1935. Adequate blood replacement and correction and maintenance of electrolyte balance require the constant attention of physician, hematologist and biochemist.

The points in this study which have particularly interested us as surgeons are:

1. Methods of establishing an accurate diagnosis of the cause of the hemorrhage.

2. The part surgical operation should play in emergency treatment.

3. The correct surgical procedure in each individual case.

In the early days of this study, surgical treatment was confined to patients who did not respond to medical treatment—that is, the operation was a late one and a last resort. The operative procedure usually consisted of a minimum technical maneuver designed to control the bleeding, such as underrunning a bleeding point or the ulcer itself, or wedge resection. In some instances the only technical procedure feasible was gastrectomy.* It was found that this approach was associated with an overall mortality of 13.6 per cent and reviews of fatal cases led us to believe that many of the patients could have been saved by earlier operation. The work of Finsterer[1] in Vienna and Gordon-Taylor[2] in London (Table 2) had already demonstrated this.

We further found that procedures short of gastrectomy were often associated with a high complication rate, especially repetition of bleeding, whereas gastrectomy was relatively unassociated with these complications. It was therefore decided to carry out a clinical experiment to determine two points:

1. How to select the case for early operation.

2. Was gastrectomy the best technical procedure.

Continuing at first to operate mainly as an ultimate part of treatment, we abandoned the minor procedures and, when operation was necessary, performed routine gastrectomy. It quickly became obvious that a point was made. Overall mortality fell to 11 per cent and morbidity was considerably reduced.

In January, 1948, we decided to follow the Finsterer method of surgical selection—that is, to perform urgent gastrectomy on all patients admitted with severe hemorrhage and a history suggestive of peptic ulceration. After only a few months it was patent that our mortality was falling so we continued the method through 1948 and 1949. Data on results are shown in Table 3.

The overall mortality had fallen from 13.6 per cent to 7 per cent and the operative mortality was 8.7 per cent in spite of the fact that 43 per cent of the patients were over 60 years of age. Fifty-nine per cent of the patients were treated surgically.

Whilst this gave cause for modest satisfaction, we found during this two-year period that we had made many diagnostic errors and a number of patients were operated on unnecessarily, mainly those with acute and subacute gastric and duodenal ulcers or erosive gastritis who might well have recovered with conservative treatment. We found, however, that our case analyses were of great value in the task of selecting patients for operation. Simply, the problem was to pick out the patient who, if treated conservatively, is in grave danger of repeated bleeding with its associated high mortality.

TABLE 3.—*Results of Treatment of Patients with Gastroduodenal Bleeding, Using Finsterer Criteria for Selection, 1948-49*

Total cases	215
Operated on (per cent)	59.0
Overall mortality (per cent)	7.0
Over 60 years (per cent)	43.0
Average age at death	65
Operations	126
Mortality (per cent)	8.7

*The author uses *gastrectomy* to mean subtotal or partial gastrectomy.

TABLE 4.—*Relationship of Severity of First Hemorrhage to Mortality*

	Number of Cases	Mortality (Per Cent)
Initial hemorrhage:		
Severe	82	21.0
Mild	118	7.6
Total	200	13.0
Died at first hemorrhage	3	11.5% of deaths
Died at repeat bleed	23	88.5% of deaths

Several factors seemed to be important.

1. *The age factor.* Mortality related to age is shown in Chart 1. Since the rate rose sharply with age, patients over 50 seemed to be candidates for early operation.

2. *The severity of the initial bleed.* The second factor considered was the character and severity of the initial hemorrhage. We classified the degree of severity into mild and severe.

Severe hemorrhage was defined as sufficient to cause collapse and shock where the blood pressure had fallen considerably. A good base line was considered to be a blood pressure below 100 mm. of mercury systolic and hemoglobin of less than 7 gm. per 100 cc.

Mild hemorrhage was defined as anything short of this and where the patient was in good condition on admission with a reasonable blood pressure and no gross clinical evidence of shock.

We found that where in one group of our cases the overall mortality was 13 per cent, the mortality in the severe cases was over 21 per cent and in the mild 7.6 per cent (Table 4). It was also noted that hematemesis was of greater significance than melena, but the simultaneous occurrence of both was gravest of all.

We have tried to assess the severity of bleeding by blood volume estimations, but in our hands the results have been inconclusive and sometimes confusing. We therefore rely entirely on clinical assessment in each case.

It has long been established and we also have found (Table 4) that it is unusual for the first hemorrhage to prove fatal, and that death usually follows one or more repetitions of the hemorrhage or occurs when hemorrhage continues in spite of adequate treatment. It is obviously important, therefore, to try to forecast the probability of recurrence of hemorrhage.

Our studies showed that the chronic and penetrating ulcer was the main offender; thus the clinical history was of the greatest importance. A long history with severe pain, especially pain radiating to the back, was the most significant. After a hemorrhage, the ulcer pain usually dramatically disappears. Where it persists, however, we have found that this indicates a chronic and often penetrating ulcer and that repetition of hemorrhage is very probable. We found also that the association of hemorrhage and stenosis was a lethal one, so that clinical evidence of stenosis, especially vomiting, must be looked for.

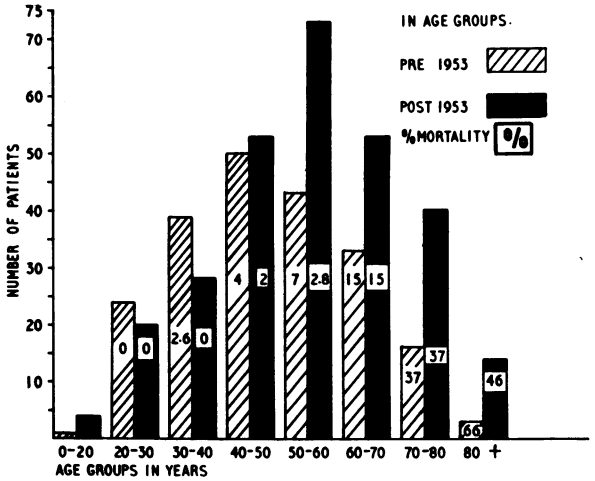


Chart 1.—Mortality related to age in peptic ulcer gastritis group.

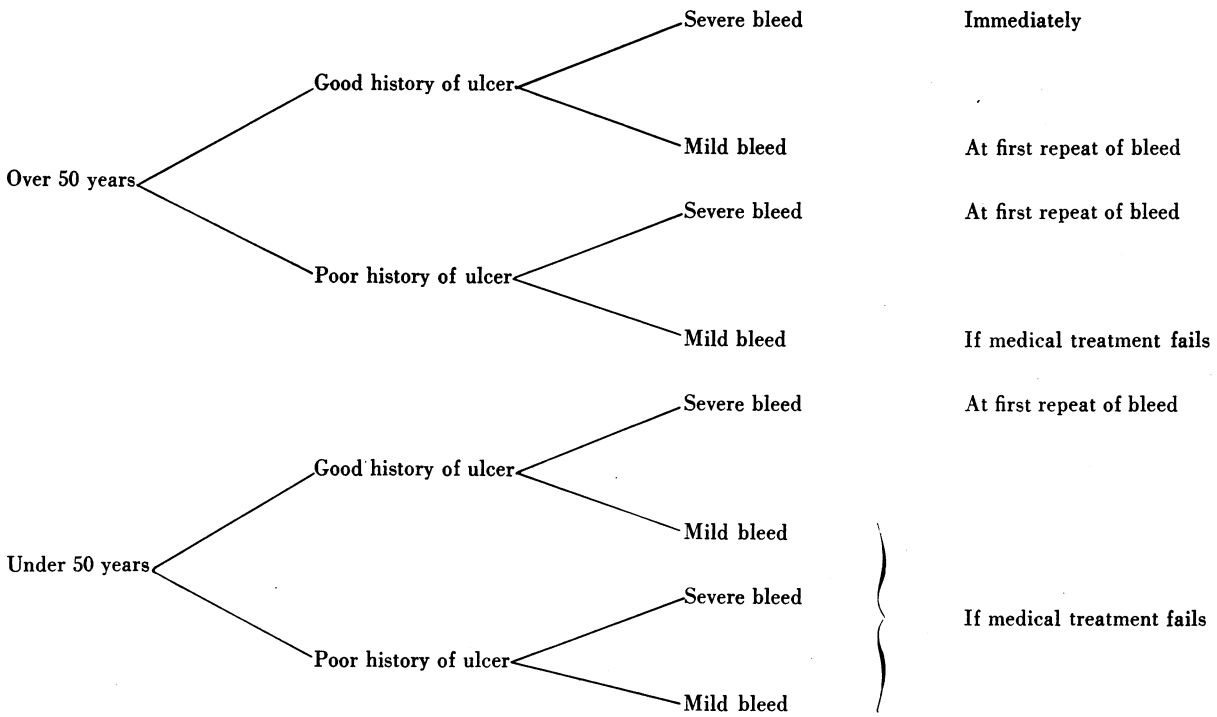
A high proportion of fatal cases had associated morbid conditions such as myocardial ischemia, chronic lung conditions, cardiac insufficiency, rheumatoid arthritis and many others; and these cases require great clinical judgment in deciding whether surgical operation or conservatism offers the best hope of survival. Generally speaking, our experience has been that although surgical mortality is bound to be high, the patients do better with gastrectomy under local anesthesia than with optimistically persistent conservatism.

With these thoughts in mind, in 1950 we decided on a method of surgical selections as shown in Chart 2.

Quite obviously it is unwise to lay down hard and fast rules in this matter and individual clinical assessment was of the utmost importance, but such a plan helped to put every member of the team on his toes and was instrumental in bringing about that little extra care and attention that might make the difference between failure and success.

Clinical symptoms are often deceptive. A giant ulcer can present with a minimum of pain and the shortest of histories, whereas the smallest ulcer, erosive gastritis or esophagitis due to hiatal hernia can be associated not only with catastrophic hemorrhage but a history closely simulating that of a chronic ulcer and even severe and persistent pain. We have therefore tried to increase our preoperative diagnostic rate by ancillary investigations.

Chart 2.—Circumstances Indicating When to Operate in Cases of Gastroduodenal Bleeding



Absolute indications *in any case:*

1. Association with perforation.
2. Association with stenosis.
3. Persistence of severe ulcer pain after hemorrhage.
4. Continuous bleeding.

Roentgenographic examination has been found unsatisfactory. The patients are often ill and a number of them collapse badly during x-ray examination. The interpretation of the films is difficult; often retained clot in the stomach will show as a confusing filling defect and a gastric ulcer if clot-filled may not show as a niche. The interpretation of duodenal cap shadows is also difficult, especially when the investigation has to be hurried and the examination has to be made with the patient supine or prone. Hence, we do not use roentgenographic investigation.

In three main lesions it is advisable if possible to avoid surgical operation: (1) Esophagitis due to an hiatal hernia; (2) erosive gastritis; (3) small acute or subacute ulcer. In this large series, only once did we operate urgently in a case of bleeding esophagitis. If the clinical history is suggestive in any way of such a lesion, we avoid operation as long as possible; and as the hemorrhage, in our experience, always ceases soon after treatment commences, an emergency hiatal hernia repair has never been necessary.

Of course gastric or duodenal ulcer can occur in association with hiatal hernia and may be the cause of the bleeding; then emergency endoscopy is of the greatest value. For some years we have carried out emergency gastroscopy in doubtful cases. Obscuration by blood in the stomach has been the cause of failure in some cases, but usually we can diagnose gastritis, small gastric ulcers and bleeding esophagitis by this means and have therefore been enabled to avoid unnecessary emergency operation. This investigation seems to cause very little disturbance to the patients, and although it is admittedly unpleasant for them they seem to tolerate it very well.

Once surgical intervention has been decided upon, no time should be lost. On more than one occasion, between decision and operation, a further hemorrhage occurred—in one case resulting in the death of the patient. However, adequate time must be spent on replacement of blood loss and in bringing the patient to the best possible condition for operation. We feel that if possible this should be done in an annex to the operating theater, for example the anesthetizing or recovery room.

ANESTHESIA AND SURGICAL TECHNIQUE

In the early days we insisted that operation should always be done under local anesthesia because there was a high incidence of postoperative pulmonary complications; but the introduction of modern techniques, especially the use of relaxants, has caused us to change our views. We now use general anesthesia as a routine but, as I have already said, we use local anesthesia if the patient is a poor risk or of advanced age.

We have long been convinced that fairly rapid operation is important. For this reason a midline incision is used as being the most rapid method of entering the upper abdomen and the easiest to close. To ascertain the cause of the bleeding a very thorough exploration of the abdomen is required in the light of the multiplicity of lesions which may cause severe gastroduodenal hemorrhage.

As to specific techniques, in summary we employ: (1) For a duodenal ulcer, gastrectomy of a Polya type with a valve; (2) for a gastric ulcer, gastrectomy of Billroth I type with gastroduodenal anastomosis. The real problem arises when no apparent cause for the bleeding can be found on palpation or external examination of the viscera.

In the early days we performed an extensive ligation of all the vessels supplying the stomach but this was associated with a rather high incidence of recurrence of bleeding. We then performed gastrotomy with manual and visual exploration of the interior of the stomach. The discovery of a lesion led to gastrectomy. For the remainder, we carried out vasoligation. This latter still was associated with repetition of bleeding so we have since 1950 performed a blind gastrectomy in such cases. There are many arguments against this principle. The two main ones are: (1) The gastrectomy is a mutilating operation and may be unnecessary; (2) the lesion may be above the line of gastric transection and even in the esophagus. The answer to the first objection is that in the circumstances we are concerned only with saving life. The second objection can be obviated as follows: Blind gastrectomy of Billroth I type is performed, but before completion of the gastroduodenal anastomosis the interior of the gastric stump is examined visually and by palpation, and any lesion found is underrun. If the lesion is a diffuse gastritis, removal of the three-fourths of the stomach seems to be adequate to prevent serious postoperative bleeding; and since we have adopted this procedure no patient has been lost from further hemorrhage.

Patients with gastroduodenal bleeding are relatively unprepared for operation. They have not had the advantage of preoperative physiotherapy and breathing exercises; many of them are excessive smokers and at certain times of the year are suffering from the effects of the London smog. In a high proportion of the older ones, postoperative pulmonary complications develop. Such complications are the commonest cause of death.

We have found that bronchoscopic suction at the end of the operation is of great value. Plugs of mucus deep in the bronchial tree can be removed under direct vision. We have also found a small bronchoscope a most useful piece of equipment in the wards and do not hesitate to use it if our physiotherapists are unable to clear the bronchi by change of posture or other simple means.

RESULTS

In the ten years 1950 through 1959 we admitted 1,497 patients with gastroduodenal hemorrhage in the peptic ulcer-gastritis group, and our mortality experience with the various kinds of lesions in this group was as follows:

	Number Patients	Deaths	Mortality (Per Cent)
Gastric ulcer	623	82	13.0
Duodenal ulcer	635	52	8.2
Anastomotic ulcer	59	1	1.6
Gastritis	121	5	4.1
Hiatal hernia	59	0	0
Total	1,497	142	9.5

The overall mortality of 9.5 per cent was higher than in the group in which the Finsterer selection was used (7.0 per cent) but lower than the 13.6 per cent that obtained during our more conservative approach. The difference in mortality between gastric ulcers and duodenal ulcers remained the same. The one death in the bleeding anastomotic ulcer group occurred following operation. Five patients died of catastrophic hemorrhage from erosive gastritis. In four of them a blind gastrectomy was necessary and the other died suddenly of repeated bleeding before we could operate. In 34 other cases, blind gastrectomy was successfully done for erosive gastritis.

The high incidence of gastric ulcers in this series is one explanation of the mortality, but an analysis of the age distribution is perhaps more revealing.

Years of Age	Number Patients	Per Cent of Total	Mortality (Per Cent)
Under 50	510	34.0	0.6
Over 50	987	66.0	14.0
Over 60	691	46.0	17.6
Over 70	400	27.0	23.2
Over 80	87	5.8	28.7

The average age of patients who died was 70 years.

Mortality associated with the age factor in a group of 395 patients treated by emergency gastrectomy was as follows:

Years of Age	Number Patients	Deaths	Per Cent of Total	Mortality (Per Cent)
Under 50	85	3	21.0	3.5
Over 50	310	67	79.0	21.6
Over 60	218	59	55.0	27.0
Over 70	109	44	28.0	40.0
Over 80	18	13	5.0	72.0

The kinds of lesions in the patients treated by emergency gastrectomy, and the mortality associated with each kind, were as follows:

	Number Patients	Deaths	Mortality (Per Cent)
Gastric ulcer	200	34	17.0 (13.0*)
Duodenal ulcer	168	31	18.0 (8.2*)
Anastomotic ulcer	8	1	12.5 (1.6*)
Gastritis	18	4	22.0 (4.1*)
Hiatal hernia	1	0	
Total	395	70	17.7

The figures in parentheses are the overall mortality rates for the whole series, shown for purposes of comparison.

Whereas for the series as a whole the mortality rate associated with gastric ulcers is higher than for duodenal ulcers, in the surgical series the position is reversed. The explanation of this is a little obscure, but we feel that a number of bleeding acute and subacute gastric ulcers require operative treatment, whereas all duodenal ulcers requiring such treatment are chronic ones. Furthermore, gastrectomy for a gastric ulcer is usually a technically easier operation than for a duodenal ulcer.

The association of perforation and hemorrhage may present in three ways:

1. As a perforation treated conservatively, or by simple suture, with the occurrence of hemorrhage during recovery. These we treat along the lines laid down for the treatment of hemorrhage.

2. As a hemorrhage in which perforation occurs during conservative treatment. These we usually treat by gastrectomy.

3. As simultaneous hemorrhage and perforation. This we treat by gastrectomy.

There were 24 cases with the combination of hemorrhage and perforation in the series, with a 41.6 per cent mortality. Six of the patients were moribund on admission and died soon after without operation. Eighteen were treated surgically, with a mortality of 22 per cent.

I hope the factor of age has not been overemphasized, but we consider it poses a most formidable problem and, in this day of extended expectation of life, an almost insoluble one. Associated serious morbid conditions were present in a high proportion of the older age patients.

Of the 1,497 patients in the whole series, 103 had very severe associated morbid conditions, and 42 of this group died. Since the total number of deaths for the entire series was 142, the complexity of the problem is emphasized.

CONCLUSIONS

Under 60 years of age the mortality of gastroduodenal hemorrhage is low. It was 2.5 per cent for that age bracket in the present series, and even when surgical treatment was necessary it was only 6.2 per cent.

Over the age of 60 the mortality rises steeply with increasing age, and where the hemorrhage is severe enough to warrant surgical treatment the mortality rises even more steeply.

By selective surgical treatment along the lines laid down, we reduced the overall mortality from 13.6 per cent to 9.5 per cent. This even though we have over the last ten years had to deal with a higher age group than in the pre-1950 series.

The low mortality during the time we were using the Finsterer criteria of selection demonstrates the value of early surgical treatment.

Endoscopy, especially gastroscopy, is of the greatest value in making accurate diagnosis and by its use we avoided operating unnecessarily in many cases.

Since old people seem to withstand gastric resection well if done as a definitive planned procedure and after careful preoperative preparation but are liable to severe postoperative complications when the operation is done in emergency, we believe that a more radical approach to peptic ulcers in general in the elderly should be adopted.

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